

## What Is Claimed Is:

1           1. A method of enabling a user to use a bridge in either a VLAN aware mode or  
2           a VLAN unaware mode, said method being performed in a layer-2 bridge containing a  
3           plurality of ports connecting to different portions of a layer-2 network, said method  
4           comprising:

5           receiving a configuration data indicating whether said bridge is to operate in said  
6           VLAN aware mode or said VLAN unaware mode;

7           receiving a packet on a first port contained in said plurality of ports; and

8           processing said packet according to said VLAN unaware mode if said  
9           configuration data indicates that said bridge is to operate in said VLAN unaware mode,  
10          and according to said VLAN aware mode if said configuration data indicates that said  
11          bridge is to operate in said VLAN aware mode.

1           2. The method of claim 1, wherein said configuration data indicates that said  
2           bridge is to operate in said VLAN unaware mode, wherein said processing comprises:

3           determining a destination port based on a destination address contained in said  
4           packet; and

5           sending said packet on said destination port.

1           3. The method of claim 2, further comprising:

2           storing an address table in a content addressable memory (CAM), wherein said  
3           address table indicates a specific one of said plurality of ports on which each packet is to

4 be forwarded; and  
5 providing in said address table a field to store data representing a VLAN identifier.

1 4. The method of claim 3, wherein said determining comprises:  
2 searching said CAM using said destination address and a pre-specified value,  
3 wherein said pre-specified value is stored in said field,  
4 whereby said CAM can be implemented without a mask and be used in  
5 combination with both of said VLAN aware mode and said VLAN unaware mode.

1 5. The method of claim 4, wherein said packet is received in an untagged format,  
2 which does not contain VLAN identifier.

1 6. The method of claim 1, wherein said configuration data indicates that said  
2 bridge is to operate in said VLAN aware mode, wherein said packet is received in an  
3 untagged format which does not contain a VLAN tag information, said processing  
4 comprises:

5 setting a VLAN identifier associated with said packet to equal an identifier  
6 associated with an incoming port on which said packet is received;

7 searching an address table using a destination address and said VLAN identifier  
8 to determine a destination port; and

9 sending said packet on said destination port.

1           7. The method of claim 6, wherein said destination port is configured for  
2 forwarding in VLAN tagged format, said method further comprising inserting said tag  
3 information into said packet before sending said packet on said destination port.

1           8. The method of claim 1, wherein said configuration data indicates that said  
2 bridge is to operate in said VLAN aware mode, wherein said packet is received in a  
3 priority tagged format containing a VLAN identifier equaling zero, wherein said  
4 processing comprises:

5           setting a VLAN identifier associated with said packet to equal an identifier  
6 associated with an incoming port on which said packet is received;

7           searching an address table using a destination address and said VLAN identifier  
8 to determine a destination port; and

9           sending said packet on said destination port.

1           9. The method of claim 8, wherein said destination port is configured for  
2 forwarding in VLAN tagged format, said method further modifying said VLAN identifier  
3 of said packet to equal said identifier.

1           10. The method of claim 1, wherein said layer-2 network comprises Ethernet  
2 network and said layer-2 bridge comprises an Ethernet bridge.

1           11. A method of using a width of a content addressable memory (CAM) effectively

2 while storing an address table, said address table containing a plurality of entries, with  
3 each of said plurality of entries providing information necessary to forward a packet on  
4 one of a plurality of ports, said method being performed in a layer-2 bridge containing a  
5 plurality of ports connecting to different portions of a layer-2 network, said method  
6 comprising:

7 maintaining a map table which maps each of a plurality of VLAN (virtual local  
8 area network) identifiers to a corresponding one of a plurality of small numbers, wherein  
9 each of said VLAN identifiers uniquely identifies a VLAN existing on said layer-2  
10 network; and

11 storing in said CAM a first entry of said address table, wherein said first entry  
12 contains one of said plurality of small numbers, and wherein said first entry is contained  
13 in said plurality of entries.

1 12. The method of claim 11, wherein each of said plurality of entries contains a  
2 first field for storing one of said plurality of small numbers, a second field for storing a  
3 layer-2 address and a third field for storing a destination port number, said method further  
4 comprising:

5 receiving a first packet on a first port contained in said plurality of ports, said first  
6 packet containing a first VLAN identifier and a first destination address;

7 examining said map table to determine a first small number corresponding to said  
8 first VLAN identifier;

9 accessing said CAM to determine a second entry matching said first small number

10 and said first destination address; and

11 forwarding said first packet on a port specified by said second entry.

1 13. The method of claim 12, wherein said layer-2 network comprises Ethernet  
2 network.

1 14. The method of claim 12, further comprising determining a list of VLAN  
2 identifiers supported by said layer-2 bridge, wherein said list of VLAN identifiers equals  
3 said plurality of VLAN identifiers.

1 15. The method of claim 14, further comprising discarding said first packet if said  
2 first VLAN identifier is not present in said map table.

1 16. The method of claim 11, further comprising:  
2 receiving on a third port a third packet containing a third VLAN identifier and a  
3 third source address, said third port being contained in said plurality of ports;  
4 examining said map table to determine a third small number corresponding to said  
5 third VLAN identifier;  
6 accessing said CAM to determine a matching entry using said third small number  
7 and said third source address; and  
8 storing in said CAM a third entry, said third entry containing said third small  
9 number, said third source address and a third port number identifying said third port if

10 said matching entry is not found.

1 17. A method of minimizing flooding in a layer-2 bridge containing a plurality of  
2 ports, said layer-2 bridge using an address table containing a plurality of entries, each of  
3 said plurality of entries specifying one of said plurality of ports on which packets  
4 containing a corresponding destination address are to be forwarded, said method  
5 comprising:

6 maintaining a priority field associated with a first entry containing said plurality  
7 of entries, said priority field indicating that said first entry is to be provided a high  
8 priority;

9 determining a situation in which a new entry is to be created in said address table  
10 and an entry in said address table is to be replaced to create said new entry; and

11 using a replacement approach which is less likely to replace said first entry than  
12 an another entry which does not have associated priority field set to high, said another  
13 entry being contained in said plurality of entries.

1 18. A method of minimizing flooding in a layer-2 bridge containing a plurality of  
2 ports, said layer-2 bridge using an address table containing a plurality of entries, each of  
3 said plurality of entries specifying one of said plurality of ports on which packets  
4 containing a corresponding destination address are to be forwarded, said method  
5 comprising:

6 receiving a first packet on an incoming port, said first packet containing a

7 destination address and a source address;

8 searching said address table to determine a destination port on which to forward  
9 said first packet;

10 determining whether said destination port is of a high priority or not;

11 setting a priority field in a first entry to be high if said destination port is  
12 determined to be of high priority, wherein said first entry is associated with said source  
13 address and said first entry is contained in said plurality of entries; and

14 using a replacement approach which is less likely to replace said first entry than  
15 an another entry which does not have associated priority field set to high.

1 19. The method of claim 18, further comprising:

2 determining to add a new entry to said address table; and

3 replacing said another entry, instead of said first entry, with said new entry due to  
4 said high priority associated with said first entry.

1 20. The method of claim 19, further comprising:

2 using a static bit associated with each of said plurality of entries, said static bit  
3 indicating whether to permit ageing, wherein an ageing time is maintained associated with  
4 each entry having an associated static bit permitting ageing, wherein said ageing time  
5 indicates whether an associated entry can be replaced; and

6 determining to add another new entry to said address table;

7 wherein said replacing replaces said first entry with said another new entry if said

8 ageing time associated with said first entry indicates that said first entry can be replaced.

1 21. The method of claim 20, wherein said priority field contains a single bit,  
2 wherein said setting sets said single bit to one value to indicate high priority and another  
3 value otherwise.

1 22. The method of claim 21, wherein said address table is stored in a content  
2 addressable memory (CAM).

1 23. The method of claim 22, wherein said layer-2 bridge comprises an Ethernet  
2 bridge.

1 24. A method of minimizing flooding in a layer-2 bridge containing a plurality of  
2 ports, said layer-2 bridge using an address table containing a plurality of entries, each of  
3 said plurality of entries specifying one of said plurality of ports on which packets  
4 containing a corresponding destination address are to be forwarded, said method  
5 comprising:

6 receiving a first packet on an incoming port, said first packet containing a  
7 destination address and a source address;

8 determining whether said incoming port is of a high priority or not;

9 setting a priority field associated with said source address in a first entry to be high

10 if said incoming port is determined to be of high priority, said first entry being contained



11 in said plurality of entries; and  
12 using a replacement approach which is less likely to replace said first entry than  
13 an another entry which does not have associated priority field set to high.

1 25. A method performed in a layer-2 bridge containing a plurality of ports, said  
2 method comprising:  
3 receiving a first packet on a first port, said first packet containing a first layer-2  
4 address as a source address, said first port being contained in said plurality of ports;  
5 storing a first entry in an address table indicating that packets with said first layer-2  
6 address as destination address are to be forwarded on said first port;  
7 receiving a second packet on a second port, said second packet containing said first  
8 layer-2 address as said source address, wherein said second port is different from said first  
9 port and said second port is also contained in said plurality of ports; and  
10 modifying said first entry, in response to receiving said second packet, to indicate  
11 that packets with said first layer-2 address as destination address are to be forwarded on  
12 said second port.

1 26. The method of claim 25, wherein said modifying comprises:  
2 searching said address table for an entry matching a combination of said first layer-  
3 2 address and said second port after receiving said second packet;  
4 checking said address table for an entry matching said first layer-2 address,  
5 without said second port, if a match is not detected for said combination, wherein said

checking causes said first entry to be selected, wherein said modifying is performed after said checking.

27. The method of claim 25, further comprising:  
receiving a third packet containing said first layer-2 address as a destination address;  
examining said address table based on said destination address to determine that said third packet is to be forwarded on said second port; and  
forwarding said third packet on said second port based on a result of said examining,  
wherein said modifying enables said third packet to be forwarded on said second port.

28. The method of claim 27, wherein said layer-2 bridge comprises an Ethernet bridge.

29. A method of minimizing congestion on a desired port in a layer-2 bridge, said desired port being contained in a plurality of ports comprised in said layer-2 bridge, said layer-2 bridge using an address table containing a plurality of entries, each of said plurality of entries specifying one of said plurality of ports on which packets containing a corresponding destination address are to be forwarded, said method comprising:  
receiving a packet on an incoming port, said packet containing a destination

7 address and a source address;

8 searching said address table to determine a destination port associated with said  
9 destination address on which to forward said packet;

10 if said destination port is not determined by said searching:

11 determining whether said incoming port equals said desired port;

12 flooding said packet on all of said ports except said desired port if

13 said incoming port is determined to be equal to said desired port; and

14 flooding said packet on all of said ports except said incoming port

15 and said desired port if said incoming port is determined to be not equal to

16 said desired port.

1 30. The method of claim 29, further comprising storing in said address table entries  
2 corresponding to all addresses reachable on said desired port.

1 31. The method of claim 30, wherein said layer-2 bridge is integrated in a device  
2 containing a main processor supporting user applications, wherein said desired port  
3 comprises an internal port which couples said layer-2 bridge to said main processor.

1 32. The method of claim 29, further comprising:  
2 determining whether said incoming port equals said destination port if said  
3 destination port is determined;  
4 forwarding said packet on said destination port if said incoming port is determined

5 as not equal to said destination port; and

6 discarding said packet if said incoming port is determined as equal to said  
7 destination port.

1 33. The method of claim 29, wherein said layer-2 bridge comprises an Ethernet  
2 bridge.

1 34. A method of processing packets related to a bridge protocol of interest, said  
2 method being performed in a layer-2 bridge containing a plurality of ports connecting to  
3 different portions of a layer-2 network, said layer-2 bridge being integrated in a device,  
4 said method comprising:

5 receiving a packet on an incoming port;

6 examining a header of said packet to determine whether said packet relates to said  
7 bridge protocol of interest; and

8 if said packet relates to said bridge protocol of interest, forwarding said packet  
9 with a high priority on an internal port to a main processor also contained in said device,  
10 wherein said main processor examines the content of said packet to determine an  
11 appropriate response to said packet, wherein said high priority causes said packet to be  
12 forwarded ahead of any other packets with lower priority awaiting forwarding on said  
13 internal port.

1 35. The method of claim 34, wherein said forwarding further comprises forwarding

2 said packet related to said bridge protocols on high priority channels of a direct memory  
3 access (DMA) and said any other packets on a low priority channels of said DMA.

1 36. The method of claim 35, wherein said bridge protocol of interest comprises one  
2 of STP, GVRP, and GMRP.

1 37. The method of claim 35, wherein said layer-2 network comprises Ethernet  
2 network and said layer-2 bridge comprises an Ethernet bridge.

1 38. A layer-2 bridge enabling usage in either a VLAN aware mode or a VLAN  
2 unaware mode, said layer-2 bridge containing a plurality of ports connecting to different  
3 portions of a layer-2 network, said layer-2 bridge comprising:

4 means for receiving a configuration data indicating whether said bridge is to  
5 operate in said VLAN aware mode or said VLAN unaware mode;

6 means for receiving a packet on a first port contained in said plurality of ports; and

7 means for processing said packet according to said VLAN unaware mode if said  
8 configuration data indicates that said bridge is to operate in said VLAN unaware mode,  
9 and according to said VLAN aware mode if said configuration data indicates that said  
10 bridge is to operate in said VLAN aware mode.

1 39. The layer-2 bridge of claim 38, wherein said configuration data indicates that  
2 said bridge is to operate in said VLAN unaware mode, wherein said means for processing

3 is operable to:

4 determine a destination port based on a destination address contained in said  
5 packet; and

6 send said packet on said destination port.

1 40. The layer-2 bridge of claim 39, further comprising:

2 means for storing an address table, wherein said address table indicates a specific  
3 one of said plurality of ports on which each packet is to be forwarded; and

4 means for providing in said address table a field to store data representing a VLAN  
5 identifier.

1 41. The layer-2 bridge of claim 40, wherein said address table is stored in a CAM,  
2 wherein said means for processing is operable to search said address table using said  
3 destination address and a pre-specified value, wherein said pre-specified value is stored  
4 in said field, whereby said CAM can be implemented without a mask and be used in  
5 combination with both of said VLAN aware mode and said VLAN unaware mode.

1 42. The layer-2 bridge of claim 41, wherein said packet is received in an untagged  
2 format, which does not contain VLAN identifier.

1 43. The layer-2 bridge of claim 38, wherein said configuration data indicates that  
2 said bridge is to operate in said VLAN aware mode, wherein said packet is received in

3 an untagged format which does not contain a VLAN tag information, said means for  
4 processing is operable to:

5 set a VLAN identifier associated with said packet to equal an identifier associated  
6 with an incoming port on which said packet is received;

7 search an address table using a destination address and said VLAN identifier to  
8 determine a destination port; and

9 send said packet on said destination port.

1 44. The layer-2 bridge of claim 43, wherein said destination port is configured for  
2 forwarding in VLAN tagged format, said layer-2 bridge further comprising means for  
3 inserting said tag information into said packet before sending said packet on said  
4 destination port.

1 45. The layer-2 bridge of claim 38, wherein said configuration data indicates that  
2 said bridge is to operate in said VLAN aware mode, wherein said packet is received in  
3 a priority tagged format containing a VLAN identifier equaling zero, wherein said means  
4 for processing is operable to:

5 set a VLAN identifier associated with said packet to equal an identifier associated  
6 with an incoming port on which said packet is received;

7 search an address table using a destination address and said VLAN identifier to  
8 determine a destination port; and

9 send said packet on said destination port.

1           46. The layer-2 bridge of claim 45, wherein said destination port is configured for  
2 forwarding in VLAN tagged format, said layer-2 bridge further comprising means for  
3 modifying said VLAN identifier of said packet to equal said identifier.

1           47. The layer-2 bridge of claim 38, wherein said layer-2 network comprises  
2 Ethernet network and said layer-2 bridge comprises an Ethernet bridge.

1           48. An apparatus for using a width of a content addressable memory (CAM)  
2 effectively while storing an address table, said address table containing a plurality of  
3 entries, with each of said plurality of entries providing information necessary to forward  
4 a packet on one of a plurality of ports, said apparatus being comprised in a layer-2 bridge  
5 containing a plurality of ports connecting to different portions of a layer-2 network, said  
6 apparatus comprising:

7           means for maintaining a map table which maps each of a plurality of VLAN  
8 (virtual local area network) identifiers to a corresponding one of a plurality of small  
9 numbers, wherein each of said VLAN identifiers uniquely identifies a VLAN existing on  
10 said layer-2 network; and

11           means for storing in said CAM a first entry of said address table, wherein said first  
12 entry contains one of said plurality of small numbers, and wherein said first entry is  
13 contained in said plurality of entries.



1           49. The apparatus of claim 48, wherein each of said plurality of entries contains  
2           a first field for storing one of said plurality of small numbers, a second field for storing  
3           a layer-2 address and a third field for storing a destination port number, said apparatus  
4           further comprising:

5                 means for receiving a first packet on a first port contained in said plurality of ports,  
6           said first packet containing a first VLAN identifier and a first destination address;

7                 means for examining said map table to determine a first small number  
8           corresponding to said first VLAN identifier;

9                 means for accessing said CAM to determine a second entry matching said first  
10          small number and said first destination address; and

11                means for forwarding said first packet on a port specified by said second entry.

1           50. The apparatus of claim 49, wherein said layer-2 network comprises Ethernet  
2           network.

1           51. The apparatus of claim 49, further comprising means for determining a list of  
2           VLAN identifiers supported by said layer-2 bridge, wherein said list of VLAN identifiers  
3           equals said plurality of VLAN identifiers.

1           52. The apparatus of claim 51, further comprising means for discarding said first  
2           packet if said first VLAN identifier is not present in said map table.

1           53. The apparatus of claim 48, further comprising:

2           means for receiving on a third port a third packet containing a third VLAN  
3 identifier and a third source address, said third port being contained in said plurality of  
4 ports;

5           means for examining said map table to determine a third small number  
6 corresponding to said third VLAN identifier;

7           means for accessing said CAM to determine a matching entry using said third  
8 small number and said third source address; and

9           means for storing in said CAM a third entry, said third entry containing said third  
10 small number, said third source address and a third port number identifying said third port  
11 if said matching entry is not found.

1           54. An apparatus for minimizing flooding in a layer-2 bridge containing a plurality  
2 of ports, said layer-2 bridge using an address table containing a plurality of entries, each  
3 of said plurality of entries specifying one of said plurality of ports on which packets  
4 containing a corresponding destination address are to be forwarded, said apparatus  
5 comprising:

6           means for maintaining a priority field associated with a first entry containing said  
7 plurality of entries, said priority field indicating that said first entry is to be provided a  
8 high priority;

9           means for determining a situation in which a new entry is to be created in said  
10 address table and an entry in said address table is to be replaced to create said new entry;

11 and

12 means for using a replacement approach which is less likely to replace said first  
13 entry than an another entry which does not have associated priority field set to high, said  
14 another entry being contained in said plurality of entries.

1 55. An apparatus for minimizing flooding in a layer-2 bridge containing a plurality  
2 of ports, said layer-2 bridge using an address table containing a plurality of entries, each  
3 of said plurality of entries specifying one of said plurality of ports on which packets  
4 containing a corresponding destination address are to be forwarded, said apparatus  
5 comprising:

6 means for receiving a first packet on an incoming port, said first packet containing  
7 a destination address and a source address;

8 means for searching said address table to determine a destination port on which to  
9 forward said first packet;

10 means for determining whether said destination port is of a high priority or not;

11 means for setting a priority field in a first entry to be high if said destination port  
12 is determined to be of high priority, wherein said first entry is associated with said source  
13 address and said first entry is contained in said plurality of entries; and

14 means for using a replacement approach which is less likely to replace said first  
15 entry than an another entry which does not have associated priority field set to high.

1 56. The apparatus of claim 55, further comprising:

2 means for determining to add a new entry to said address table; and  
3 means for replacing said another entry, instead of said first entry, with said new  
4 entry due to said high priority associated with said first entry.

1 57. The apparatus of claim 56, further comprising:

2 means for using a static bit associated with each of said plurality of entries, said  
3 static bit indicating whether to permit ageing, wherein an ageing time is maintained  
4 associated with each entry having an associated static bit permitting ageing, wherein said  
5 ageing time indicates whether an associated entry can be replaced; and  
6 means for determining to add another new entry to said address table;  
7 wherein said means for replacing replaces said first entry with said another new  
8 entry if said ageing time associated with said first entry indicates that said first entry can  
9 be replaced.

1 58. The apparatus of claim 57, wherein said priority field contains a single bit,  
2 wherein said means for setting sets said single bit to one value to indicate high priority  
3 and another value otherwise.

1 59. The apparatus of claim 58, wherein said address table is stored in a content  
2 addressable memory (CAM).

1 60. The apparatus of claim 59, wherein said layer-2 bridge comprises an Ethernet

2 bridge.

1 61. An apparatus for minimizing flooding in a layer-2 bridge containing a plurality  
2 of ports, said layer-2 bridge using an address table containing a plurality of entries, each  
3 of said plurality of entries specifying one of said plurality of ports on which packets  
4 containing a corresponding destination address are to be forwarded, said apparatus  
5 comprising:

6 means for receiving a first packet on an incoming port, said first packet containing  
7 a destination address and a source address;

8 means for determining whether said incoming port is of a high priority or not;

9 means for setting a priority field associated with said source address in a first entry  
10 to be high if said incoming port is determined to be of high priority, said first entry being  
11 contained in said plurality of entries; and

12 means for using a replacement approach which is less likely to replace said first  
13 entry than an another entry which does not have associated priority field set to high.

1 62. An apparatus contained in a layer-2 bridge, said layer-2 bridge in turn  
2 containing a plurality of ports, said apparatus comprising:

3 means for receiving a first packet on a first port, said first packet containing a first  
4 layer-2 address as a source address, said first port being contained in said plurality of  
5 ports;

6 means for storing a first entry in an address table indicating that packets with said

7 first layer-2 address as destination address are to be forwarded on said first port;

8 means for receiving a second packet on a second port, said second packet  
9 containing said first layer-2 address as said source address, wherein said second port is  
10 different from said first port and said second port is also contained in said plurality of  
11 ports; and

12 means for modifying said first entry, in response to receiving said second packet,  
13 to indicate that packets with said first layer-2 address as destination address are to be  
14 forwarded on said second port.

1 63. The apparatus of claim 62, wherein said means for modifying is operable to:  
2 search said address table for an entry matching a combination of said first layer-2  
3 address and said second port after receiving said second packet; and  
4 check said address table for an entry matching said first layer-2 address, without  
5 said second port, if a match is not detected for said combination, wherein said check  
6 causes said first entry to be selected, wherein said modifying is performed after said  
7 check.

1 64. The apparatus of claim 62, further comprising:  
2 means for receiving a third packet containing said first layer-2 address as a  
3 destination address;  
4 means for examining said address table based on said destination address to  
5 determine that said third packet is to be forwarded on said second port; and

6 means for forwarding said third packet on said second port based on a result of  
7 said examining,  
8 wherein said modifying enables said third packet to be forwarded on said second  
9 port.

1 65. The apparatus of claim 64, wherein said layer-2 bridge comprises an Ethernet  
2 bridge.

1 66. An apparatus for minimizing congestion on a desired port in a layer-2 bridge,  
2 said desired port being contained in a plurality of ports comprised in said layer-2 bridge,  
3 said layer-2 bridge using an address table containing a plurality of entries, each of said  
4 plurality of entries specifying one of said plurality of ports on which packets containing  
5 a corresponding destination address are to be forwarded, said apparatus comprising:

6 means for receiving a packet on an incoming port, said packet containing a  
7 destination address and a source address;

8 means for searching said address table to determine a destination port associated  
9 with said destination address on which to forward said packet;

10 if said destination port is not determined by said means for searching:

11 means for determining whether said incoming port equals said  
12 desired port;

13 means for flooding said packet on all of said ports except said  
14 desired port if said incoming port is determined to be equal to said desired

15                   port; and  
16                   means for flooding said packet on all of said ports except said  
17                   incoming port and said desired port if said incoming port is determined to  
18                   be not equal to said desired port.

1               67. The apparatus of claim 66, further comprising means for storing in said address  
2               table entries corresponding to all addresses reachable on said desired port.

1               68. The apparatus of claim 67, wherein said layer-2 bridge is integrated in a  
2               device containing a main processor supporting user applications, wherein said desired  
3               port comprises an internal port which couples said layer-2 bridge to said main processor.

1               69. The apparatus of claim 66, further comprising:  
2               means for determining whether said incoming port equals said destination port if  
3               said destination port is determined;  
4               means for forwarding said packet on said destination port if said incoming port is  
5               determined as not equal to said destination port; and  
6               means for discarding said packet if said incoming port is determined as equal to  
7               said destination port.

1               70. The apparatus of claim 66, wherein said layer-2 bridge comprises an Ethernet  
2               bridge.



1           71. An apparatus for processing packets related to a bridge protocol of interest,  
2       said apparatus being contained in a layer-2 bridge, said layer-2 bridge in turn containing  
3       a plurality of ports connecting to different portions of a layer-2 network, said layer-2  
4       bridge being integrated in a device, said apparatus comprising:

5           means for receiving a packet on an incoming port;

6           means for examining a header of said packet to determine whether said packet  
7       relates to said bridge protocol of interest; and

8           if said packet relates to said bridge protocol of interest, means for forwarding said  
9       packet with a high priority on an internal port to a main processor also contained in said  
10      device, wherein said main processor examines the content of said packet to determine an  
11      appropriate response to said packet, wherein said high priority causes said packet to be  
12      forwarded ahead of any other packets with lower priority awaiting forwarding on said  
13      internal port.

1           72. The apparatus of claim 71, wherein said means for forwarding is operable to  
2       forward said packet related to said bridge protocols on high priority channels of a direct  
3       memory access (DMA) and said any other packets on a low priority channels of said  
4       DMA.

1           73. The apparatus of claim 72, wherein said bridge protocol of interest comprises  
2       one of STP, GVRP, and GMRP.

1           74. The apparatus of claim 72, wherein said layer-2 network comprises Ethernet  
2 network and said layer-2 bridge comprises an Ethernet bridge.

1           75. A machine readable medium carrying one or more sequences of instructions  
2 for enabling a user to use a layer-2 bridge in either a VLAN aware mode or a VLAN  
3 unaware mode, said layer-2 bridge containing a plurality of ports connecting to different  
4 portions of a layer-2 network, wherein execution of said one or more sequences of  
5 instructions by one or more processors contained in said layer-2 bridge causes said one  
6 or more processors to perform the actions of:

7           receiving a configuration data indicating whether said bridge is to operate in said  
8 VLAN aware mode or said VLAN unaware mode;

9           receiving a packet on a first port contained in said plurality of ports; and

10          processing said packet according to said VLAN unaware mode if said  
11 configuration data indicates that said bridge is to operate in said VLAN unaware mode,  
12 and according to said VLAN aware mode if said configuration data indicates that said  
13 bridge is to operate in said VLAN aware mode..

1           76. The machine readable medium of claim 75, wherein said configuration data  
2 indicates that said bridge is to operate in said VLAN unaware mode, wherein said  
3 processing comprises:

4           determining a destination port based on a destination address contained in said

5 packet; and

6 sending said packet on said destination port.

1 77. The machine readable medium of claim 76, further comprising:

2 storing an address table in a content addressable memory (CAM), wherein said

3 address table indicates a specific one of said plurality of ports on which each packet is to

4 be forwarded; and

5 providing in said address table a field to store data representing a VLAN identifier.

1 78. The machine readable medium of claim 77, wherein said determining

2 comprises:

3 searching said CAM using said destination address and a pre-specified value,

4 wherein said pre-specified value is stored in said field,

5 whereby said CAM can be implemented without a mask and be used in

6 combination with both of said VLAN aware mode and said VLAN unaware mode.

1 79. The machine readable medium of claim 78, wherein said packet is received in

2 an untagged format, which does not contain VLAN identifier.

1 80. The machine readable medium of claim 75, wherein said configuration data

2 indicates that said bridge is to operate in said VLAN aware mode, wherein said packet

3 is received in an untagged format which does not contain a VLAN tag information, said

4 processing comprises:

5       setting a VLAN identifier associated with said packet to equal an identifier  
6 associated with an incoming port on which said packet is received;

7       searching an address table using a destination address and said VLAN identifier  
8 to determine a destination port; and

9       sending said packet on said destination port.

1       81. The machine readable medium of claim 80, wherein said destination port is  
2 configured for forwarding in VLAN tagged format, further comprising inserting said tag  
3 information into said packet before sending said packet on said destination port.

1       82. The machine readable medium of claim 75, wherein said configuration data  
2 indicates that said bridge is to operate in said VLAN aware mode, wherein said packet  
3 is received in a priority tagged format containing a VLAN identifier equaling zero,  
4 wherein said processing comprises:

5       setting a VLAN identifier associated with said packet to equal an identifier  
6 associated with an incoming port on which said packet is received;

7       searching an address table using a destination address and said VLAN identifier  
8 to determine a destination port; and

9       sending said packet on said destination port.

1       83. The machine readable medium of claim 82, wherein said destination port is

2 configured for forwarding in VLAN tagged format, further comprising modifying said  
3 VLAN identifier of said packet to equal said identifier.

1 84. The machine readable medium of claim 75, wherein said layer-2 network  
2 comprises Ethernet network and said layer-2 bridge comprises an Ethernet bridge.

1 85. A machine readable medium carrying one or more sequences of instructions  
2 for using a width of a content addressable memory (CAM) effectively while storing an  
3 address table in a layer-2 bridge, said address table containing a plurality of entries, with  
4 each of said plurality of entries providing information necessary to forward a packet on  
5 one of a plurality of ports, said layer-2 bridge containing a plurality of ports connecting  
6 to different portions of a layer-2 network, wherein execution of said one or more  
7 sequences of instructions by one or more processors contained in said layer-2 bridge  
8 causes said one or more processors to perform the actions of:

9 maintaining a map table which maps each of a plurality of VLAN (virtual local  
10 area network) identifiers to a corresponding one of a plurality of small numbers, wherein  
11 each of said VLAN identifiers uniquely identifies a VLAN existing on said layer-2  
12 network; and

13 storing in said CAM a first entry of said address table, wherein said first entry  
14 contains one of said plurality of small numbers, and wherein said first entry is contained  
15 in said plurality of entries.

1           86. The machine readable medium of claim 85, wherein each of said plurality of  
2 entries contains a first field for storing one of said plurality of small numbers, a second  
3 field for storing a layer-2 address and a third field for storing a destination port number,  
4 further comprising:

5           receiving a first packet on a first port contained in said plurality of ports, said first  
6 packet containing a first VLAN identifier and a first destination address;

7           examining said map table to determine a first small number corresponding to said  
8 first VLAN identifier;

9           accessing said CAM to determine a second entry matching said first small number  
10 and said first destination address; and

11          forwarding said first packet on a port specified by said second entry.

1           87. The machine readable medium of claim 86, wherein said layer-2 network  
2 comprises Ethernet network.

1           88. The machine readable medium of claim 86, further comprising determining a  
2 list of VLAN identifiers supported by said layer-2 bridge, wherein said list of VLAN  
3 identifiers equals said plurality of VLAN identifiers.

1           89. The machine readable medium of claim 88, further comprising discarding said  
2 first packet if said first VLAN identifier is not present in said map table.

1           90. The machine readable medium of claim 85, further comprising:

2           receiving on a third port a third packet containing a third VLAN identifier and a  
3           third source address, said third port being contained in said plurality of ports;

4           examining said map table to determine a third small number corresponding to said  
5           third VLAN identifier;

6           accessing said CAM to determine a matching entry using said third small number  
7           and said third source address; and

8           storing in said CAM a third entry, said third entry containing said third small  
9           number, said third source address and a third port number identifying said third port if  
10          said matching entry is not found.

1          91. A machine readable medium carrying one or more sequences of instructions  
2          for minimizing flooding in a layer-2 bridge containing a plurality of ports, said layer-2  
3          bridge using an address table containing a plurality of entries, each of said plurality of  
4          entries specifying one of said plurality of ports on which packets containing a  
5          corresponding destination address are to be forwarded, wherein execution of said one or  
6          more sequences of instructions by one or more processors contained in said layer-2 bridge  
7          causes said one or more processors to perform the actions of:

8           maintaining a priority field associated with a first entry containing said plurality  
9           of entries, said priority field indicating that said first entry is to be provided a high  
10          priority;

11          determining a situation in which a new entry is to be created in said address table

12 and an entry in said address table is to be replaced to create said new entry; and  
13 using a replacement approach which is less likely to replace said first entry than  
14 an another entry which does not have associated priority field set to high, said another  
15 entry being contained in said plurality of entries.

1 92. A machine readable medium carrying one or more sequences of instructions  
2 for minimizing flooding in a layer-2 bridge containing a plurality of ports, said layer-2  
3 bridge using an address table containing a plurality of entries, each of said plurality of  
4 entries specifying one of said plurality of ports on which packets containing a  
5 corresponding destination address are to be forwarded, wherein execution of said one or  
6 more sequences of instructions by one or more processors contained in said layer-2 bridge  
7 causes said one or more processors to perform the actions of:

8 receiving a first packet on an incoming port, said first packet containing a  
9 destination address and a source address;

10 searching said address table to determine a destination port on which to forward  
11 said first packet;

12 determining whether said destination port is of a high priority or not;

13 setting a priority field in a first entry to be high if said destination port is  
14 determined to be of high priority, wherein said first entry is associated with said source  
15 address and said first entry is contained in said plurality of entries; and

16 using a replacement approach which is less likely to replace said first entry than  
17 an another entry which does not have associated priority field set to high.



1           93. The machine readable medium of claim 92, further comprising:  
2           determining to add a new entry to said address table; and  
3           replacing said another entry, instead of said first entry, with said new entry due to  
4           said high priority associated with said first entry.

1           94. The machine readable medium of claim 93, further comprising:  
2           using a static bit associated with each of said plurality of entries, said static bit  
3           indicating whether to permit ageing, wherein an ageing time is maintained associated with  
4           each entry having an associated static bit permitting ageing, wherein said ageing time  
5           indicates whether an associated entry can be replaced; and  
6           determining to add another new entry to said address table;  
7           wherein said replacing replaces said first entry with said another new entry if said  
8           ageing time associated with said first entry indicates that said first entry can be replaced.

1           95. The machine readable medium of claim 94, wherein said priority field contains  
2           a single bit, wherein said setting sets said single bit to one value to indicate high priority  
3           and another value otherwise.

1           96. The machine readable medium of claim 95, wherein said address table is stored  
2           in a content addressable memory (CAM).

1           97. The machine readable medium of claim 96, wherein said layer-2 bridge  
2 comprises an Ethernet bridge.

1           98. A machine readable medium carrying one or more sequences of instructions  
2 for minimizing flooding in a layer-2 bridge containing a plurality of ports, said layer-2  
3 bridge using an address table containing a plurality of entries, each of said plurality of  
4 entries specifying one of said plurality of ports on which packets containing a  
5 corresponding destination address are to be forwarded, wherein execution of said one or  
6 more sequences of instructions by one or more processors contained in said layer-2 bridge  
7 causes said one or more processors to perform the actions of:

8           receiving a first packet on an incoming port, said first packet containing a  
9 destination address and a source address;

10          determining whether said incoming port is of a high priority or not;

11          setting a priority field associated with said source address in a first entry to be high  
12 if said incoming port is determined to be of high priority, said first entry being contained  
13 in said plurality of entries; and

14          using a replacement approach which is less likely to replace said first entry than  
15 an another entry which does not have associated priority field set to high.

1           99. A machine readable medium carrying one or more sequences of instructions  
2 for minimizing flooding in a layer-2 bridge containing a plurality of ports, said layer-2  
3 bridge using an address table containing a plurality of entries, each of said plurality of

4 entries specifying one of said plurality of ports on which packets containing a  
5 corresponding destination address are to be forwarded, wherein execution of said one or  
6 more sequences of instructions by one or more processors contained in said layer-2 bridge  
7 causes said one or more processors to perform the actions of:

8 receiving a first packet on a first port, said first packet containing a first layer-2  
9 address as a source address, said first port being contained in said plurality of ports;

10 storing a first entry in an address table indicating that packets with said first layer-2  
11 address as destination address are to be forwarded on said first port;

12 receiving a second packet on a second port, said second packet containing said first  
13 layer-2 address as said source address, wherein said second port is different from said first  
14 port and said second port is also contained in said plurality of ports; and

15 modifying said first entry, in response to receiving said second packet, to indicate  
16 that packets with said first layer-2 address as destination address are to be forwarded on  
17 said second port.

1 100. The machine readable medium of claim 99, wherein said modifying  
2 comprises:

3 searching said address table for an entry matching a combination of said first layer-  
4 2 address and said second port after receiving said second packet;

5 checking said address table for an entry matching said first layer-2 address,  
6 without said second port, if a match is not detected for said combination, wherein said  
7 checking causes said first entry to be selected, wherein said modifying is performed after

8 said checking.

1 101. The machine readable medium of claim 99, further comprising:  
2 receiving a third packet containing said first layer-2 address as a destination  
3 address;  
4 examining said address table based on said destination address to determine that  
5 said third packet is to be forwarded on said second port; and  
6 forwarding said third packet on said second port based on a result of said  
7 examining,  
8 wherein said modifying enables said third packet to be forwarded on said second  
9 port.

1 102. The machine readable medium of claim 101, wherein said layer-2 bridge  
2 comprises an Ethernet bridge.

1 103. A machine readable medium carrying one or more sequences of instructions  
2 for minimizing congestion on a desired port in a layer-2 bridge, said desired port being  
3 contained in a plurality of ports comprised in said layer-2 bridge, said layer-2 bridge  
4 using an address table containing a plurality of entries, each of said plurality of entries  
5 specifying one of said plurality of ports on which packets containing a corresponding  
6 destination address are to be forwarded, wherein execution of said one or more sequences  
7 of instructions by one or more processors contained in said layer-2 bridge causes said one

8 or more processors to perform the actions of:

9 receiving a packet on an incoming port, said packet containing a destination  
10 address;

11 searching said address table to determine a destination port associated with said  
12 destination address on which to forward said packet;

13 if said destination port is not determined by said searching:

14 determining whether said incoming port equals said desired port;

15 flooding said packet on all of said ports except said desired port if  
16 said incoming port is determined to be equal to said desired port; and

17 flooding said packet on all of said ports except said incoming port  
18 and said desired port if said incoming port is determined to be not equal to  
19 said desired port.

1 104. The machine readable medium of claim 103, further comprising storing in  
2 said address table entries corresponding to all addresses reachable on said desired port.

1 105. The machine readable medium of claim 104, wherein said layer-2 bridge is  
2 integrated in a device containing a main processor supporting user applications, wherein  
3 said desired port comprises an internal port which couples said layer-2 bridge to said main  
4 processor.

1 106. The machine readable medium of claim 103, further comprising:

2 determining whether said incoming port equals said destination port if said  
3 destination port is determined;

4 forwarding said packet on said destination port if said incoming port is determined  
5 as not equal to said destination port; and

6 discarding said packet if said incoming port is determined as equal to said  
7 destination port.

1 107. The machine readable medium of claim 103, wherein said layer-2 bridge  
2 comprises an Ethernet bridge.

1 108. A machine readable medium carrying one or more sequences of instructions  
2 for processing packets related to a bridge protocol of interest, said machine readable  
3 medium being performed in a layer-2 bridge containing a plurality of ports connecting to  
4 different portions of a layer-2 network, said layer-2 bridge being integrated in a device,  
5 wherein execution of said one or more sequences of instructions by one or more  
6 processors contained in said layer-2 bridge causes said one or more processors to perform  
7 the actions of:

8 receiving a packet on an incoming port;

9 examining a header of said packet to determine whether said packet relates to said  
10 bridge protocol of interest; and

11 if said packet relates to said bridge protocol of interest, forwarding said packet  
12 with a high priority on an internal port to a main processor also contained in said device,

13 wherein said main processor examines the content of said packet to determine an  
14 appropriate response to said packet, wherein said high priority causes said packet to be  
15 forwarded ahead of any other packets with lower priority awaiting forwarding on said  
16 internal port.

1 109. The machine readable medium of claim 108, wherein said forwarding further  
2 comprises forwarding said packet related to said bridge protocols on high priority  
3 channels of a direct memory access (DMA) and said any other packets on a low priority  
4 channels of said DMA.

1 110. The machine readable medium of claim 109, wherein said bridge protocol of  
2 interest comprises one of STP, GVRP, and GMRP.

1 111. The machine readable medium of claim 109, wherein said layer-2 network  
2 comprises Ethernet network and said layer-2 bridge comprises an Ethernet bridge.

1 112. A layer-2 bridge enabling usage in either a VLAN aware mode or a VLAN  
2 unaware mode, said layer-2 bridge containing a plurality of ports connecting to different  
3 portions of a layer-2 network, said layer-2 bridge comprising:

4 a medium access control (MAC) block receiving a packet on a first port contained  
5 in said plurality of ports;

6 a memory storing said packet;

7 a processing unit receiving a configuration data indicating whether said bridge is  
8 to operate in said VLAN aware mode or said VLAN unaware mode, and said processing  
9 unit processing said packet according to said VLAN unaware mode if said configuration  
10 data indicates that said bridge is to operate in said VLAN unaware mode, and according  
11 to said VLAN aware mode if said configuration data indicates that said bridge is to  
12 operate in said VLAN aware mode.

1 113. The layer-2 bridge of claim 112, wherein said configuration data indicates  
2 that said bridge is to operate in said VLAN unaware mode, wherein said processing unit  
3 determines a destination port based on a destination address contained in said packet, and  
4 sends said packet on said destination port.

1 114. The layer-2 bridge of claim 113, further comprising a content addressable  
2 memory (CAM) storing an address table, wherein said address table indicates a specific  
3 one of said plurality of ports on which each packet is to be forwarded, wherein said  
4 address table contains a field to store data representing a VLAN identifier.

1 115. The layer-2 bridge of claim 114, wherein said processing unit is operable to:  
2 search said CAM using said destination address and a pre-specified value, wherein  
3 said pre-specified value is stored in said field, whereby said CAM can be implemented  
4 without a mask and be used in combination with both of said VLAN aware mode and said  
5 VLAN unaware mode.



1           116. The layer-2 bridge of claim 115, wherein said packet is received in an  
2           untagged format, which does not contain VLAN identifier.

1           117. The layer-2 bridge of claim 112, wherein said configuration data indicates  
2           that said bridge is to operate in said VLAN aware mode, wherein said packet is received  
3           in an untagged format which does not contain a VLAN tag information, said processing  
4           unit being operable to:

5                 set a VLAN identifier associated with said packet to equal an identifier associated  
6                 with an incoming port on which said packet is received;

7                 search an address table using a destination address and said VLAN identifier to  
8                 determine a destination port; and

9                 send said packet on said destination port.

1           118. The layer-2 bridge of claim 117, wherein said destination port is configured  
2           for forwarding in VLAN tagged format, said layer-2 bridge wherein processing unit is  
3           further operable to insert said tag information into said packet before sending said packet  
4           on said destination port.

1           119. The layer-2 bridge of claim 112, wherein said configuration data indicates  
2           that said bridge is to operate in said VLAN aware mode, wherein said packet is received  
3           in a priority tagged format containing a VLAN identifier equaling zero, wherein said

4 processing unit is further operable to:

5 set a VLAN identifier associated with said packet to equal an identifier associated  
6 with an incoming port on which said packet is received;

7 search an address table using a destination address and said VLAN identifier to  
8 determine a destination port; and

9 send said packet on said destination port.

1 120. The layer-2 bridge of claim 119, wherein said destination port is configured  
2 for forwarding in VLAN tagged format, said processing unit further modifying said  
3 VLAN identifier of said packet to equal said identifier.

1 121. The layer-2 bridge of claim 112, wherein said layer-2 network comprises  
2 Ethernet network and said layer-2 bridge comprises an Ethernet bridge.

1 122. An apparatus for using a width of a content addressable memory (CAM)  
2 effectively while storing an address table, said address table containing a plurality of  
3 entries, with each of said plurality of entries providing information necessary to forward  
4 a packet on one of a plurality of ports, said apparatus being comprised in a layer-2 bridge  
5 containing a plurality of ports connecting to different portions of a layer-2 network, said  
6 apparatus comprising:

7 a memory containing a map table which maps each of a plurality of VLAN (virtual  
8 local area network) identifiers to a corresponding one of a plurality of small numbers,

9 wherein each of said VLAN identifiers uniquely identifies a VLAN existing on said layer-  
10 2 network; and

11 a processing unit storing in said CAM a first entry of said address table, wherein  
12 said first entry contains one of said plurality of small numbers, and wherein said first  
13 entry is contained in said plurality of entries.

1 123. The apparatus of claim 122, wherein each of said plurality of entries contains  
2 a first field for storing one of said plurality of small numbers, a second field for storing  
3 a layer-2 address and a third field for storing a destination port number, wherein said  
4 processing unit is operable to:

5 receive a first packet on a first port contained in said plurality of ports, said first  
6 packet containing a first VLAN identifier and a first destination address;

7 examine said map table to determine a first small number corresponding to said  
8 first VLAN identifier;

9 access said CAM to determine a second entry matching said first small number and  
10 said first destination address; and

11 forward said first packet on a port specified by said second entry.

1 124. The apparatus of claim 123, wherein said layer-2 network comprises Ethernet  
2 network.

1 125. The apparatus of claim 123, wherein said processing unit determines a list of

VLAN identifiers supported by said layer-2 bridge, wherein said list of VLAN identifiers equals said plurality of VLAN identifiers.

126. The apparatus of claim 125, wherein said processing unit discards said first packet if said first VLAN identifier is not present in said map table.

127. The apparatus of claim 122, wherein said processing unit is operable to:  
receive on a third port a third packet containing a third VLAN identifier and a third source address, said third port being contained in said plurality of ports;  
examine said map table to determine a third small number corresponding to said third VLAN identifier;  
access said CAM to determine a matching entry using said third small number and said third source address; and  
store in said CAM a third entry, said third entry containing said third small number, said third source address and a third port number identifying said third port if said matching entry is not found.

128. An apparatus minimizing flooding in a layer-2 bridge containing a plurality of ports, said apparatus comprising:  
a content addressable memory (CAM) storing an address table containing a plurality of entries, each of said plurality of entries specifying one of said plurality of ports on which packets containing a corresponding destination address are to be

6 forwarded, a priority field being associated with a first entry containing said plurality of  
7 entries, said priority field indicating that said first entry is to be provided a high priority;  
8 a processing unit determining a situation in which a new entry is to be created in  
9 said address table and an entry in said address table is to be replaced to create said new  
10 entry, and using a replacement approach which is less likely to replace said first entry  
11 than an another entry which does not have associated priority field set to high, said  
12 another entry being contained in said plurality of entries.

1 129. An apparatus minimizing flooding in a layer-2 bridge containing a plurality  
2 of ports, said apparatus comprising:

3 a content addressable memory (CAM) storing an address table containing a  
4 plurality of entries, each of said plurality of entries specifying one of said plurality of  
5 ports on which packets containing a corresponding destination address are to be  
6 forwarded;

7 a processing unit receiving a first packet on an incoming port, said first packet  
8 containing a destination address and a source address, said processing unit searching said  
9 address table to determine a destination port on which to forward said first packet, said  
10 processing unit determining whether said destination port is of a high priority or not and  
11 setting a priority field in a first entry to be high if said destination port is determined to  
12 be of high priority, wherein said first entry is associated with said source address and said  
13 first entry is contained in said plurality of entries, and

14 said processing unit using a replacement approach which is less likely to replace

15     said first entry than an another entry which does not have associated priority field set to  
16     high.

1           130. The apparatus of claim 129, wherein said processing unit is operable to:  
2           determine to add a new entry to said address table; and  
3           replace said another entry, instead of said first entry, with said new entry due to  
4     said high priority associated with said first entry.

1           131. The apparatus of claim 130, wherein said address table contains a static bit  
2     associated with each of said plurality of entries, said static bit indicating whether to  
3     permit ageing, wherein an ageing time is maintained associated with each entry having  
4     an associated static bit permitting ageing, wherein said ageing time indicates whether an  
5     associated entry can be replaced, said processing unit being further operable to:  
6           determine to add another new entry to said address table, and to replace said first  
7     entry with said another new entry if said ageing time associated with said first entry  
8     indicates that said first entry can be replaced.

1           132. The apparatus of claim 131, wherein said priority field contains a single bit,  
2     wherein said processing unit sets said single bit to one value to indicate high priority and  
3     another value otherwise.

1           133. The apparatus of claim 132, wherein said address table is stored in a content

2 addressable memory (CAM).

1 134. The apparatus of claim 133, wherein said layer-2 bridge comprises an  
2 Ethernet bridge.

1 135. An apparatus for minimizing flooding in a layer-2 bridge containing a  
2 plurality of ports, said apparatus comprising:

3 a content addressable memory (CAM) storing an address table containing a  
4 plurality of entries, each of said plurality of entries specifying one of said plurality of  
5 ports on which packets containing a corresponding destination address are to be  
6 forwarded;

7 a medium access control (MAC) block receiving a first packet on an incoming  
8 port, said first packet containing a destination address and a source address; and

9 a processing unit determining whether said incoming port is of a high priority or  
10 not, and setting a priority field associated with said source address in a first entry to be  
11 high if said incoming port is determined to be of high priority, said first entry being  
12 contained in said plurality of entries,

13 said processing unit using a replacement approach which is less likely to replace  
14 said first entry than an another entry which does not have associated priority field set to  
15 high.

1 136. A layer-2 bridge comprising:

2 a random access memory (RAM);  
3 a medium access control (MAC) block receiving a first packet on a first port, said  
4 first packet containing a first layer-2 address as a source address, said first port being  
5 contained in a plurality of ports provided in said layer-2 bridge, said MAC block storing  
6 said first packet in said RAM;  
7 a content addressable memory (CAM) storing an address table indicating that  
8 packets with said first layer-2 address as destination address are to be forwarded on said  
9 first port; and  
10 a processing unit receiving a second packet, said second packet containing said  
11 first layer-2 address as said source address, wherein said second port is different from said  
12 first port and said second port is also contained in said plurality of ports,  
13 said processing unit modifying said first entry, in response to receiving said second  
14 packet, to indicate that packets with said first layer-2 address as destination address are  
15 to be forwarded on said second port.

1 137. The apparatus of claim 136, wherein said processing unit is operable to:  
2 search said address table for an entry matching a combination of said first layer-2  
3 address and said second port after receiving said second packet;  
4 check said address table for an entry matching said first layer-2 address, without  
5 said second port, if a match is not detected for said combination, wherein said checking  
6 causes said first entry to be selected, wherein said modifying is performed after said  
7 checking.



1           138. The apparatus of claim 136, wherein said processing unit is further operable  
2   to:  
3           receive a third packet containing said first layer-2 address as a destination address;  
4           examine said address table based on said destination address to determine that said  
5   third packet is to be forwarded on said second port; and  
6           forward said third packet on said second port based on a result of said examining.

1           139. The apparatus of claim 138, wherein said layer-2 bridge comprises an  
2   Ethernet bridge.

1           140. A layer-2 bridge operable to provide reduced flooding on a desired port, said  
2   desired port being contained in a plurality of ports comprised in said layer-2 bridge, said  
3   layer-2 bridge comprising:

4           a content addressable memory (CAM) storing an address table containing a  
5   plurality of entries, each of said plurality of entries specifying one of said plurality of  
6   ports on which packets containing a corresponding destination address are to be  
7   forwarded;

8           a medium access control (MAC) block receiving a packet on an incoming port,  
9   said packet containing a destination address;

10          a processing unit searching said address table to determine a destination port  
11   associated with said destination address on which to forward said first packet,

12 if said destination port is not determined by said searching, said processing unit  
13 determining whether said incoming port equals said desired port and flooding said packet  
14 on all of said ports except said desired port if said incoming port is determined to be equal  
15 to said desired port, said processing unit flooding said packet on all of said ports except  
16 said incoming port and said desired port if said incoming port is determined to be not  
17 equal to said desired port.

1 141. The layer-2 bridge of claim 140, wherein said processing unit stores in said  
2 address table entries corresponding to all addresses reachable on said desired port.

1 142. The layer-2 bridge of claim 141, wherein said layer-2 bridge is integrated in  
2 a device containing a main processor supporting user applications, wherein said desired  
3 port comprises an internal port which couples said layer-2 bridge to said main processor.

1 143. The layer-2 bridge of claim 140, wherein said processing unit is operable to:  
2 determine whether said incoming port equals said destination port if said  
3 destination port is determined;  
4 forward said packet on said destination port if said incoming port is determined as  
5 not equal to said destination port; and  
6 discard said packet if said incoming port is determined as equal to said destination  
7 port.

1           144. The layer-2 bridge of claim 140, wherein said layer-2 bridge comprises an  
2 Ethernet bridge.

1           145. A layer-2 bridge for processing packets related to a bridge protocol of  
2 interest, said layer-2 bridge containing a plurality of ports connecting to different portions  
3 of a layer-2 network, said layer-2 bridge being integrated in a device, said layer-2 bridge  
4 comprising:

5           a medium access control (MAC) block receiving a packet on an incoming port;

6           a processing unit examining a header of said packet to determine whether said  
7 packet relates to said bridge protocol of interest, said processing unit forwarding said  
8 packet with a high priority on an internal port to a main processor also contained in said  
9 device if said packet relates to said bridge protocol of interest,

10          wherein said main processor examines the content of said packet to determine an  
11 appropriate response to said packet, wherein said high priority causes said packet to be  
12 forwarded ahead of any other packets with lower priority awaiting forwarding on said  
13 internal port.

1           146. The layer-2 bridge of claim 145, wherein said forwarding further comprises  
2 forwarding said packet related to said bridge protocols on high priority channels of a  
3 direct memory access (DMA) and said any other packets on a low priority channels of  
4 said DMA.

1           147. The layer-2 bridge of claim 146, wherein said bridge protocol of interest  
2           comprises one of STP, GVRP, and GMRP.

1           148. The layer-2 bridge of claim 146, wherein said layer-2 network comprises  
2           Ethernet network and said layer-2 bridge comprises an Ethernet bridge.